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Does night-time public transport contribute to inclusive night mobility? Exploring Sofia's night bus network from a gender perspective

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Abstract

In most night-time cities, there is stark inequality of access to transport and mobility, along various lines including gender. In this paper, we examine the extent to which a new night-time public transport service reshapes genderrelated mobility inclusion and exclusion at night. We argue that research on gender and night-time mobility needs to focus on more than safety concerns, because gendered experiences of nocturnal cities have a range of inter-related but distinctive dimensions which exceed safety. Our framework explores four dimensions, including unsafety, cost, distance and destinations, and immobility (staying local or at home). The paper draws on a mixed-method examination of the 2018 launch of a night bus network in Sofia, Bulgaria. Using an exploratory statistical analysis and qualitative interview data, we demonstrate that the introduction of a new service cannot be uncritically assumed to foster greater equality of access to the urban night. Instead, some aspects of the new service have partially countered the ways in which the built environment, economic, and social relations create exclusionary mobilities at night, while other dynamics of exclusion have been reproduced. The proposed approach highlights how changes in transport policy and gendered mobilities shape each other in situated ways, with implications for the broader literature on transport inclusion and exclusion.

Keywords

night-time; public transport; gender; inclusion; night mobility

Highlights

- Examines the implications of a new night bus service for gender-inclusive mobility.
- Argues research on gender and night mobility should not focus exclusively on safety.
- Alongside safety, adds dimensions of cost, distances and destinations, and immobility.

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1. Introduction

Researchers have long recognised the urban night as a timespace of potentially contradictory meanings (Melbin, 1978; Sharma, 2014; Shaw, 2018). On one hand, the night-time city can be associated with freedom and leisure, replete with opportunities for greater self-expression and escape from the routines of daytime. On the other hand, many people's experiences of cities after dark are defined by exclusion and inequality, often made visible through unequal access to mobility and immobility (Collectiu Punt 6, 2017; Schwanen et al., 2012). Mobility at night and unequal access to it are strongly shaped by gender dynamics (Sheard, 2011). This is evident in differences in observable mobility practices between women and men, but importantly relates also to the underlying gendered relations which shape mobility and immobility (Law, 1999). These dynamics might not manifest themselves in observed travel behaviour: for instance, care work such as childcare can increase carers' night-time mobility, not because of freedom or significant resources, but because daytime care responsibilities can make work or leisure during the day impossible (Sharma, 2014).

While a growing body of research has demonstrated the significance of mobility to processes of social exclusion and inclusion (Akyelken, 2017; Lucas, 2012; Schwanen et al., 2015), the gendered dimensions of nocturnal mobility remain underexplored. To the extent that they are reported, gendered night mobility research has mostly focused on safety, vulnerability and crime (Cozens et al., 2004; Loukaitou-Sideris and Fink, 2008). Safety and vulnerability are undoubtedly important to mobility and immobility at night, yet focusing exclusively on them is insufficient in accounting for the multi-faceted nature of gendered mobilities. In this paper we explore safety concerns as one dimension of gendered night mobilities, in a framework which points to a wider variety of ways in which changes in transport policy and practice render mobility at night more or less inclusive.

A related concern of the paper is that in prior discussions, the benefits of night-time public transport for inclusion are often neglected, or alternatively, they are uncritically assumed (Volterra Partners and London First, 2014). What aspects of access to mobility are made possible by night transport services – affordability, access to jobs and services, safety, to name a few – and for whom, can be unclear. Bringing together these two sets of concerns, we examine the 2018 introduction of a night bus service in Sofia, Bulgaria. We draw on a theoretical perspective informed by gender studies in transport and mobility and on a mixed-method research design, in order to critically examine the impact of night-time public transport on inclusion.

The paper is organised as follows. Sections 2 Night-time public transport, 3 Gender-related transport exclusion discuss night-time mobility and gender-inclusive mobility, respectively. Section 4 introduces the research location, and Section 5 provides a summary of the methods used to collect and analyse the data discussed in the paper. Each of sections 6 to 9 deals with one aspect of the gendered dynamics we examine:

unsafety; cost; distance and destinations; and staying local or at home. The final section provides a discussion of the implications of the findings for transport policy both in the context of Sofia and beyond, as well as offering some preliminary conclusions on this little-researched topic.

2. Night-time public transport

As of early 2019, 26 of the 28 capital cities in the European Union had some form of night-time public transport (the exceptions being Nicosia, Cyprus and Tallinn, Estonia). However, this number masks a complex and uneven situation: for example, the London Night Tube operates all night, but only on a limited number of underground lines, and on Friday and Saturday nights only, alongside a more comprehensive night bus service (McArthur et al., 2019). By contrast, Rome has 20 low-frequency night bus lines every night of the week. Night-time public transport is also highly susceptible to change in line with shifts in political agendas and economic circumstances. For instance, the night bus network of Brussels, launched in 2007, was drastically reduced in 2008 in response to budgetary pressures (Lebrun et al., 2012). In the decade since, the Brussels service has seen intermittent expansions and cuts in response to local politicians' priorities.

It can be argued that existing theoretical frameworks on inclusive urban mobility are – whether implicitly or explicitly – orientated towards daytime mobility. While it is important not to frame the day and night-time as discrete temporal containers, the distinctive aspects of nocturnal mobility must not be overlooked. These include: greater importance of safety considerations in organising trips; limited availability or absence of public transport services; and the increased cost associated with urban mobility, e.g. through greater reliance on taxis (Plyushteva, 2019). However, to the extent that local governments provide night-time transport services, their planning continues to be based overwhelmingly on economic considerations rather than 'social' aspects such as inclusion, affordability, or personal and road safety (see Levy, 2013 on the social vs. economic distinction in transport planning; McArthur et al., 2019). Research on how different policy agendas result in different approaches to planning night-time transport remains scarce. To date, it has mostly occupied a secondary place in consultancies' reports on the urban night, framed in terms of its underexploited contribution to urban economic growth (ARUP, 2015; Volterra Partners and London First, 2014). Thus, where it exists, night-time public transport has generally been positioned at the service of the night-time economy (NTE), boosting customer flows to hospitality and entertainment establishments, and contributing to cities' increasingly widespread efforts to be seen as 'lively' night-time destinations (Transport for London, 2017).

In Sofia, for a long time the position of the local government had been that providing public transport at night meant directing resources towards the 'wrong' kind of passengers, i.e. party-goers and those likely to cause trouble and/or damage to vehicles (Zografsky, 2018). Two different publics were constructed in officials' rhetoric on the topic – the hard-working morning commuter on a crowded bus, versus the night club patron customer who could afford a taxi if they wished. This rhetoric mirrored previous findings from other cities, which have generally shown that local governments can be reluctant to provide night transport services: ridership levels at night are perceived as too low to justify investment, and night bus budgets are consequently often framed as a drain on the resources needed for peak times (Jones et al., 2003; McArthur et al., 2019).

However, in Sofia a sustained civil society campaign, starting in 2015, has helped somewhat in shifting and expanding the debate on the possible societal benefits of night-time transport (see further discussion in Section 4 below).

3. Gender-related transport exclusion

Research on gender inequality in transport and mobility is both a well-established and a rapidly growing field (Grieco and McQuaid, 2012; Hanson, 2010; Levy, 2013; Uteng and Cresswell, 2008). However, the theoretical approaches taken under this broad heading vary greatly. Historically, scholarship on women and transport has relied on positivist, and arguably somewhat essentialist, comparisons of the travel behaviour of men and women (Joelsson and Lindkvist Scholten, 2019, p. 3). Such research has been important in documenting inequalities, for instance in terms of travel times, access to private cars, ability to reach job opportunities, share of income spent on mobility, and experiences of vulnerability (Kwan and Kotsev, 2014; Lecompte and Bocarejo, 2017). More recently, work on mobility has increasingly explored relational, embodied and situated understandings of how gendered inequalities are produced and reproduced by and through mobility (Hanrahan, 2018; Law, 1999; Plyushteva and Schwanen, 2018; Schwanen, 2007).

In this context, gender-related transport exclusion denotes the ways in which gender relations shape processes of mobility inclusion and exclusion (Pojani et al., 2017). Increasingly, inclusive mobility has been defined not in terms of access to transport as an end in itself, but in terms of the extent to which mobility enables or precludes access to activities and services, thus shaping broader social inclusion (Martens, 2016; Schwanen et al., 2015). In cases where transport acts as a barrier to accessing resources and opportunities, and/or exacerbates the processes through which individuals and groups experience deprivation, this is described as transport-related social exclusion (Kamruzzaman et al., 2016; Lucas et al., 2018). Crucially, binary understandings of exclusion/inclusion can be unhelpful, since exclusion is processual rather than either present or absent (Schwanen et al., 2015).

To apply this reasoning to gender-related transport exclusion means to look beyond the immediately observable in terms of men and women's unequal access to urban mobility. To do this, we frame our discussion in terms of the gendered relations which underlie mobility and immobility at night. A focus on relations suggests that comparing the quantifiable impacts of night-time public transport on the mobility of women to that of men, is only a starting point. Our aim is to understand how the introduction of a new night bus service might disrupt, modify or reproduce gendered modes of exclusion in the nocturnal city, shaping the mobility and immobility of both women and men.

To the extent that a gender perspective has been applied to mobility at night, the focus tends to be limited to women's perceptions of safety and vulnerability. Research has shown that mobility at night is often associated with greater fear of crime and feelings of vulnerability, meaning travel behaviour is shaped by concerns about possible dangers (Cozens et al., 2004; Currie et al., 2013). Such experiences are particularly likely to be reported by women (Collectiu Punt 6, 2017; Yavuz and Welch, 2010). However, the gendered nature of nocturnal mobilities is about more than women's experiences and feelings of unsafety. While extremely important to tackle, and very significant in shaping

exclusion, unsafety interacts with various other dimensions of gendered experiences of mobility to shape how women and men travel at night, or why they do not.

Thus, to understand its impact on inclusion, it is important, but insufficient, to ask whether night-time public transport increases feelings of safety at night. Drawing inductively from the thematic analysis of qualitative data conducted as part of this research project, we discuss a total of four dimensions of gendered nocturnal mobility: vulnerability and unsafety; cost of nocturnal mobility; distances and destinations; and staying local/at home. While this is not an exhaustive conceptualisation of the kinds of impacts a new transport service may have on gendered experiences of inclusion and exclusion, we argue that such a framework allows for a nuanced and situated account of some of the key aspects of nocturnal mobility in Sofia which have been affected by the new service.

4. Research location

Sofia had a population of approximately 1.3 million people in 2017 (National Statistics Institute, 2018). With 157 people per sq km in 2015, Sofia was also among the least densely populated capital cities in the European Union (Eurostat, 2018). Despite its low population density, Sofia has an extensive public transport network, partly reflecting the social inclusion-driven approach to public transport applied until 1989 under state Socialism. Although the network of trams, trolleybuses and buses suffered from severe underfunding and mismanagement for decades, the 2000s marked a turning point, with gradual renewing of rolling stock and a rapidly growing metro network, mostly made possible through access to European Union funds (Plyushteva, 2016). However, earlier attempts to introduce a night-time public transport service, in the 1980s, 1990s and 2000s, had been short-lived and limited in reach.

A campaign for a night bus network was launched in Sofia in 2015, by a group of local activists led by vocal urban and transport planning advocacy group Spasi Sofia (Spasi Sofia, 2015). The activists collected over 30,000 signatures by campaigning on the streets of Sofia in the evening time, and ultimately the campaign attained sufficient momentum, and coverage in traditional and online media, to convince the local authority, Sofia Capital Municipality, to introduce a night bus service on a trial basis.

The night bus network was inaugurated in April 2018. The initially announced eight-month trial period was extended to a year, and subsequently extended again, to the end of 2019 and possibly beyond (Dnevnik, 2018a). In public statements, the transport authority (Sofia Urban Mobility Centre) stressed that both financial and non-financial criteria would be used to evaluate the trial and make a decision as to whether to continue the service (Avramov, 2018). However, no specific goals in terms of either benefit-to-cost ratios, or non-financial goals such as social inclusion, incidence of drink driving, or environmental impacts, have been made public. Notably, the definition of what constitutes sufficient farebox takings, as well as which additional criteria should be met for the service to be considered viable in the long-term, remain at the discretion of the municipal authority. According to local activists, this means that the demands placed upon the service can be shifted in non-transparent ways, allowing officials to justify its survival or discontinuation according to continuously changing political priorities (Borisov, 2018). As the impact on social inclusion has not been recognised among these

criteria as of late 2019, no official monitoring or evaluating practices have been put in place in relation to inclusion, which has largely motivated the analysis we present in this paper.

The night bus network is made up of four radial lines which reach outer residential neighbourhoods of the city and intersect at Alexander I Square, a main square in the city centre (see Fig. 1). While its location is central, the Alexander I interchange stop is surrounded mostly by public institutions, parks, and office buildings, and is some distance away from most late-hour leisure and hospitality venues. Night buses run on every night of the week, departing from the central stop at midnight, with the last services departing the city centre around 4am (Sofia Urban Mobility Centre, 2018). The interval between buses on each line is 40 min, with all buses waiting for 5 min at Alexander I Square in order to provide for transfers. Tickets are sold by an on-board conductor, and cost 2.00lv,[1] compared to the daytime public transport ticket priced at 1.60lv. Public transport travelcards are not accepted. However, the 2.00lv ticket is valid for an unlimited number of transfers over the course of a single night, in contrast to daytime tickets, which are only valid for a single boarding.

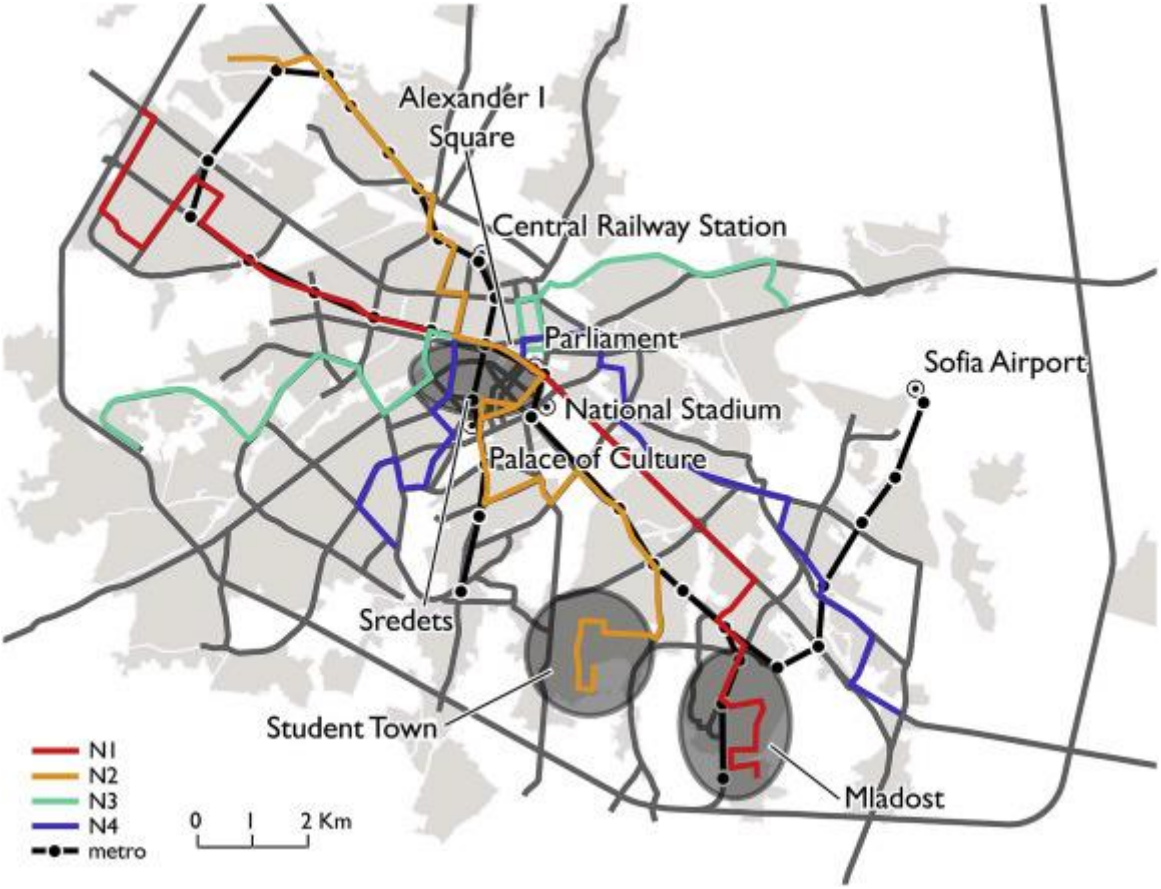

Fig. 1. Map of Sofia indicating the four night bus routes, the central interchange stop at Alexander I Square, and areas where most night-time trips begin and end. Key landmarks and the two metro lines (which operate only during daytime hours) are provided for reference. Map by authors.

The launch of the trial service was supported by an extensive information campaign online and using billboards. Nevertheless, both primary and secondary data sources

demonstrated that in late 2018 there was still much confusion as to the price, schedule, routes and other specifics of the night bus network. For instance, buses only stopped when a waiting passenger waved to indicate intention to board. Since this practice was not part of the daytime operations of the public transport network, some users complained that buses routinely did not stop, leaving them to wait for 40 min for the next vehicle (Dnevnik, 2018b).

As of late 2019, the long-term survival of the service remained unclear. While the advocates of the night buses conceded that they represented a loss-making operation requiring substantial subsidies, Spasi Sofia and others have repeatedly argued that policy aims for this service should extend beyond financial feasibility. Activists continued to reiterate wider policy goals for a night-time public transport service, including accessibility for workers and leisure travellers, inclusion of those living in the urban periphery in the city's nightlife, quality of the public realm at night, city image, and improving personal and road safety through reducing drink-driving and increasing the number of people out at night (Borisov, 2018). The gender dimensions of changing provisions for night mobility have not been explicitly addressed by either the civil society advocates of night buses, or the Sofia authorities.

5. Research methods

The theoretical focus on mobility and gender relations informs our mixed-method research design. We take quantitative data as a point of departure, identifying gender differences, followed by an exploration of subjective and relational dimensions of gendered night mobility using more nuanced qualitative data (see Hesse-Biber and Johnson, 2013; Lynn, 2004 for relevant discussions on mixed methods). We draw on survey data collected in 2015 by Spasi Sofia as part of their campaign for night-time public transport (Spasi Sofia, 2018, 2015), alongside an analysis of in-depth interview data we collected in 2017 and 2018. The survey data were collected online, with the survey distributed via the advocacy group's social media accounts. A total of 6276 completed questionnaires were submitted. This was not a representative sample but a convenience sample drawn from a particular group, made up largely of people sympathetic to the organisation and its proposal. However, the large sample allowed us to use the data to explore a range of experiences of night-time mobility, attitudes, and barriers faced. 69.8% of respondents were aged between 18 and 26, with only 2.4% aged 46 or older. By contrast, the Census carried out in 2011 found that 35.1% of the population of Sofia was 50 or older (National Statistics Institute, 2012). However, it should be noted that those mobile at night, at least for the purpose of leisure, are often younger than the overall population (Roberts and Eldridge, 2007). Thus, while the sample may not be representative of the wider population, it provides insights into the experiences of those groups at which night transport services are most likely to be aimed. In terms of gender, 49.9% of respondents were women, a share which broadly reflects the 52.3% share of women in the urban population. Similarly, the representation of the 24 administrative districts of Sofia was mostly reflective of their share in the city's population, with one exception: Studentski Grad, a district with a high concentration of higher education students, accounts for 5.6% of the population of Sofia, but represented as many as 18.6% of responses to the night mobility survey. Once again, this reflects the greater than average likelihood for students to be mobile at night, both for leisure and for work in Sofia's tourism and hospitality sectors in particular. Among the 6276 survey

respondents, 92.5% reported needing to travel after 23:30 for either work or leisure at least some of the time. Of these, 24.8% made at least some of their nocturnal trips for the purposes of going to, and/or returning from, paid work.

It has not been our intention to conduct a thorough statistical analysis of the survey data, for example by building explanatory models. However, we use a number of straightforward statistical techniques to support our arguments. We use the independent sample *t*-test (to compare averages, mostly between women and men), bivariate logistic regression, linear regression and multinomial regression (depending on whether the dependent variable is binary, continuous or categorical). In all cases, we assume a p-value of 0.05 as the upper significance threshold. If the distribution of the variables strongly deviates from the normal distribution (e.g. the distance-based variables in Section 8), we first apply a natural logarithmic transformation before we calculate the correlation.

The in-depth interview data were collected in 2017 and 2018 as part of a research project on shift workers' commutes. A total of 36 in-depth qualitative interviews were conducted, each lasting approximately 60 min. Participants were recruited through snowball sampling, with invitations to participate initially sent to 327 Sofia-based tourism and hospitality establishments using email and social media. All but five interview participants were either owners or workers in tourism and hospitality businesses. Data collected focused on the modes, times, routes, costs and barriers faced in the context of both daytime and night-time mobility. We focus on these sectors for two reasons. Firstly, tourism and hospitality shift work is particularly relevant to our aim of examining the affordability dimension of transport-related social exclusion at night, given that many night workers in these sectors earn lower and more insecure pay compared to night workers in manufacturing, healthcare, or call centre jobs (Plyushteva and Schwanen, 2018). Thus, this group of night commuters is likely to be especially sensitive to the savings a night bus can offer compared to taxis or the private car. Secondly, given the focus on NTE in urban policies focused on night-time transport (Smeds et al., 2019), our project has aimed to contrast the mobility experiences of NTE workers with those of patrons.

Interview data were analysed using an inductive thematic coding approach facilitated by qualitative data analysis software. A total of 28 codes were identified, and these were grouped into four themes: vulnerability and unsafety; cost of nocturnal mobility; distances and destinations; and staying local/at home. We adopted these four themes as the four dimensions of the night bus impact to investigate, applying them to the analysis of both quantitative and qualitative data.

The 2015 survey pre-dates the launch of the night network and provides insights on participants' nocturnal mobility in its absence, as well as asking them to outline their expectations and concerns regarding a potential future night bus service. The 2017–18 interview data were collected in the months immediately before and after the launch, when participants could draw on specific information available regarding the network, timetable and ticketing of night buses, as well as on their own direct experiences. We also draw on a range of secondary data, including night bus ridership figures available from the Sofia transport authority (Sofia Urban Mobility Centre, or SUMC), and

publications in the local and national media, in which the introduction of night-time public transport in Sofia received extensive coverage.

There has been some debate as to whether the urban night refers to a pre-defined segment of a 24-h period, or a subjectively experienced timespace (Shaw, 2018). For our purposes, we define the night as starting at 23:30 and ending at 05:00, which reflects the time period when public transport was previously practically unavailable in Sofia. References to trips, journeys and transport encompass both motorised transport and trips made on foot and by bicycle.

6. Feeling unsafe

In criminological research, a distinction is often drawn between 'actual' levels of victimisation and perceived unsafety, even if more recently this approach has been questioned (Thomas and Bromley, 2000; Yavuz and Welch, 2010). Distinguishing between feelings of being vulnerable, and 'objective' measures such as reported crime rates can be productive, especially if used to challenge stigmas associated with specific urban neighbourhoods (Sampson and Raudenbush, 2004). However, such a distinction is unhelpful for our purposes. In the context of night mobility, 'perceived' unsafety shapes how people move at night in very 'real' terms, what transport mode or route they choose, and whether they feel able to leave their local area or their home (Plyushteva, 2019). Our focus on subjective experiences thus points not to a lack of objectivity, but to the specific and consequential ways in which feeling unsafe amounts to lived experience. Thus, this section examines whether research participants felt unsafe in Sofia at night, and the extent to which night-time public transport reconfigures such feelings of vulnerability and their impact on mobility.

When in the 2015 survey respondents were asked to rank how safe they felt in Sofia at night on a scale of 1–10, men reported a mean score of 5.82, while women's mean score was 4.42 (2-tailed Sig. 0.00). One interview participant summarised her experiences of night-time unsafety thus:

"In terms of traffic, the night is safer, fewer cars, you are more likely to notice someone approaching. But exactly because there are fewer people, that makes me more concerned. Because if something happens, there might not be anyone around to see that something is happening to you. Especially there, along the cycle path in Tsar Boris III Boulevard where I cycle home. And in some parts, it's very badly lit. So, you have to cycle fast and run if you have to! [exasperated laugh] I haven't had to do it, I hope I won't have to." (Darya, 28yo, bartender)

In both survey and interview responses, women were more likely to be concerned about inadequate street lighting, insufficient police presence, and the presence of stray dogs (see Fig. 2). These findings are in line with earlier research on gender differences in feelings of fear and unsafety, both in nocturnal urban settings, and in public transport at any time of the day or night (Delbosc and Currie, 2012; Loukaitou-Sideris and Fink, 2008). It is also not surprising that there were significant gender differences in reporting a sense of danger in connection to specific types of urban spaces at night, such as bus stops and pedestrian underpasses. However, it is notable in the means reported above, that men also scored fairly low, which suggests that feeling unsafe at night is not

simply defined by quantifiable gender differences. The in-depth interviews allowed us to explore these results in greater depth, and some research participants who were men openly acknowledged feeling vulnerable when on the move at night:

"Interviewer: Were you ever worried for your safety [walking home after work at night]?

H: Yes, I have even had incidents. [pause] I don't remember the details of what happened, but I was attacked. I got pushed to the ground by someone, from behind. They attacked me. I was bruised afterwards.

Interviewer: How did this affect you?

H: (…) For the first few weeks I did have a kind of trauma, I guess. I didn't want to go home alone. But then I got over it." (Hector, 28yo, customer assistant in a multiplex cinema)

I am concerned about:	Dangerous bus stops and underpasses	Weak or missing street lighting	Missing or broken sidewalks and paths	Lack of police presence	Stray dogs
Exp(B)	0.34*	0.68*	1.34*	0.65*	0.88*
p	0.00	0.00	0.00	0.00	0.00

Fig. 2. Logistic regression odds ratios ((Exp(B)) and significance levels (p) of reported concerns associated with night mobility, with gender as the independent variable (reference category is female).

In the 2015 survey, the only aspect of nocturnal unsafety which men were more likely to report compared to women, was 'missing or broken sidewalks.' This issue is not trivial in nocturnal Sofia, as broken sidewalks meant a danger of tripping and falling, while missing sidewalks could force pedestrians to take the risk of walking on the road. Arguably, women reported this issue less often since, while potentially dangerous in terms of personal injury, sidewalks concerns paled in comparison with the stronger fear associated with the risk of assault, or an attack by stray dogs.

The survey offered inconclusive data on the connection between transport mode and feelings of vulnerability. For both men and women, those who walked at night were more likely to feel unsafe (2-tailed Sig. 0.01),[2] and taking a taxi was associated with greater safety (based on bivariate linear regression). However, interviews made it clear that the connection between feeling unsafe and transport mode was complex. For instance, taxis could be experienced as a safer alternative relative to walking, but they could also be a source of anxiety, and feel like a compromise, especially given the additional cost:

"It's good to have night buses. Since I also have had bad experiences with taxi drivers. Maybe not really that bad, but I have acquaintances who have had really bad experiences with taxi drivers. So this is a good alternative. This is crazy, after midnight to [have to] support these taxi drivers [by using their services]." (Bogdana, 24yo, bartender)

Thus, the introduction of the night bus may reduce the need to walk through dangerous spaces or be in threatening situations in some instances, while creating new situations of vulnerability while waiting for the bus, and walking to and from stops. With walking

after dark associated with fear, these aspects of nocturnal public transport use remain a serious barrier for those concerned about their safety (Currie et al., 2013).

At the same time, the ticketing strategy adopted by the Sofia Urban Mobility Centre (SUMC) made a specific if indirect contribution to reducing experiences of unsafety: unlike daytime tickets, night bus tickets were sold on board, by a conductor, reducing the need to find a vending point and the risk of missing a bus while looking for change.[3] Local transport authorities also stressed that the presence of a conductor would discourage potential assailants from harassing passengers while on board (Avramov, 2018). However, several interview participants shared that they felt fearful of being followed once off the bus. Arguably, the existing policy of having two SUMC employees on board every bus can be harnessed further in alleviating experiences of unsafety, for instance through staff training in proactively tackling threatening situations, and by actively encouraging passengers through information campaigns to speak to staff whenever they feel unsafe.

The contribution of the night bus to safer nocturnal mobilities can thus be interpreted in terms of two dimensions: direct, as night bus users gain access to a safer mode of mobility compared to walking; and indirect, as the presence of the service signalled an overall change in the nocturnal city, including a sense of commitment by the local authorities to provide for the needs of those who are mobile at night. This second dimension has a strong gender aspect. On one hand, the overwhelming majority of respondents to the 2015 survey (86.2%) stated that they would make use of the night bus service. On the other hand, women were over-represented among the minority of respondents who intended to continue using taxis even in the presence of a night bus (2-tailed Sig. 0.04, based on bivariate logistic regression). At the same time, women were especially likely to see the night bus as a positive contribution to safety and security at night. For them, the benefits for safety appeared to be associated not with the use of the transport mode in itself, but with an increased presence of people on nocturnal city streets, resulting from the night bus introduction, and the knowledge that another mobility option was available. While gender did not in itself predict the likelihood of respondents intending to use the night bus, income significantly influenced this intention (Exp(B) 0.84, 2-tailed Sig. 0.00, based on bivariate logistic regression). In the next section, we turn to the ways in which the economic implications of the night bus service are consequential from the perspective of gender and inclusion.

7. The cost of night mobility

The affordability of night-time mobility has important gender dimensions. Our analysis pointed to two separate but interrelated ways in which gender relations shaped how affordability is experienced. First, the women who responded to the 2015 survey had lower incomes compared to those of men – 56.7% of them earned less than 600 levs *per* month, compared to 39.9% of men (Fig. 3). A Mann-Whitney test was also used to confirm the significance of the difference in income levels between men and women overall, and specifically between men and women night workers, since we assumed this group had less choice in whether to travel at night.

	Monthly income					
	0-300lv	*301-600lv*	*601-1,000lv*	*1,001-2,000lv*	*2,001lv+*	*Total*
Men	22.9%	17.0%	20.9%	24.6%	14.6%	100.0%
Women	33.0%	23.7%	20.7%	18.2%	4.3%	100.0%
	Monthly income (night workers):					
	0-300lv	*301-600lv*	*601-1,000lv*	*1,001-2,000lv*	*2,001lv+*	*Total*
Men	15.5%	24.4%	27.8%	23.4%	8.9%	100.0%
Women	25.5%	33.3%	21.8%	16.0%	3.4%	100.0%

Fig. 3. Income brackets by gender, all respondents (top), and night workers (bottom).

Second, women were more likely to rely on taxis, the most expensive mode of nocturnal transport. While in 2015 taxis were the most commonly used nocturnal mode for both women and men (see Fig. 4), the share of women relying on this mode of transport was greater for both work and leisure:

	Transport mode used most often to/from night work (2015)				
	Taxi	*Private car*	*On foot*	*Employer transport*	*Total*
Men	48.4%	21.3%	25.0%	5.2%	100.0%
Women	62.3%	10.6%	21.3%	5.7%	100.0%
	Transport mode used most often to/from night leisure (2015)				
	Taxi	*Private car*	*On foot*	*Other*	*Total*
Men	51.5%	14.1%	27.6%	6.8%	100.0%
Women	67.5%	7.6%	19.8%	5.1%	100.0%

Fig. 4. Modes for night work and night leisure trips by gender.

This unequal relative burden of the cost of nocturnal travel is further exacerbated by a third dimension. Since income inequality was especially pronounced among night workers (58.8% of women in this sub-group earned less than 600lv, whereas working at night did not increase the likelihood of earning a low income among men; Fig. 3), it was low-income women in particular that were likely to spend a disproportionate share of their income on night mobility as a result of relying on taxis:

"I start work at 6pm, and the shift finishes around midnight, so I leave around 1am. By then, there is no public transport [in this area]. At that time, I call a taxi – I always call one specific firm. Their prices are cheap, however, they don't have many cars, so sometimes it happens that I call and there are no cars. Then I have to walk to a taxi stand nearby – by Eagle Bridge. I have to pass through the pedestrian subway, which late at night is not pleasant. Sometimes, if I get a taxi from the street, it has happened that the price is three or four times what it should be." (Jenya, 22yo, server in a restaurant)

Given the findings reported in Section 6, Jenya's account should be highlighted as a situation in which women might find it particularly hard to initiate a confrontation with a driver who is overcharging them. This demonstrates yet another way in which the seemingly objective and fixed price of a taxi is in fact experienced differently as a result

of the gendered nature of the social relations of mobility at night. Feeling unsafe when out at night is thus not only a burden in itself, but importantly, it exacerbates gendered income inequalities. Income inequality is a key factor in how those mobile at night perceive the night bus network. In the 2015 survey, those on lower incomes were more likely to report that they would use it, and more likely to state it will improve their economic situation (see Fig. 5).

Introducing night-time public transport would have a positive impact on:	mobility	nightlife	cultural life	my economic circumstances	the economy	the labour market	safety and security	Sofia's image	It would not have a positive effect
Exp(B)	1.02	1.02	1.04	0.88*	1.02	0.98	0.96*	1.05*	1.45*
p	0.57	0.30	0.07	0.00	0.40	0.22	0.02	0.01	0.00

Fig. 5. Logistic regression odds ratios ((Exp(B)) and significance levels (p) of reported expectations regarding night-time public transport, with income as the independent variable (categorical).

Thus, night-time public transport has the potential to contribute to more affordable nocturnal mobility, which would benefit the otherwise double-disadvantaged lower-income women. However, this result was limited by the SUMC policy of maintaining a separate ticketing system for the night bus network. Greater benefits in terms of inclusive mobility could be achieved by integrating the night fare into daytime fare options, specifically by accepting existing public transport travelcards (the majority of holders of which are women, Kwan and Kotsev, 2014) during the night (for the gender implications of fare integration, see also Lecompte and Bocarejo, 2017).

Tickets for the night bus were not only separate, but also more expensive compared to daytime tickets (2.00lv versus 1.60lv as of early 2019). The survey results demonstrated how this ticketing strategy would augment the economic burden carried by night workers: among those respondents who commuted to or from work between 23:30 and 05:00, the reverse journey took place either before or after this period in 81.5% of cases. Thus, the night bus ticket would cover both the inward and outward journeys only for a small minority of respondents. As a result, most public transport travelcard holders are subject to two ticketing systems and two sets of expenses in relation to their commute.

Yet, taken only within the context of night mobility, the 2.00lv ticket presents an intervention which promotes inclusion along gender lines, as it has an equalising effect on transport affordability. It is not only cheaper than a taxi ride, but is also fixed for all durations and distances, as an unlimited number of transfers can be made during one night. Overall, this pricing policy is beneficial to those on lower incomes, and particularly women, in two ways. First, it does not penalise those living on the remote outskirts of the city, as the cost of a taxi does; second, it costs the same for those taking one bus, and those who have to transfer between night bus lines, minimising the distance they have to walk between bus stop and destination.

However, the night bus can also have indirect negative effects for those mobile at night who previously received a taxi subsidy from their employer. As of early 2019, some

employers of shift workers in Sofia provided a financial contribution towards night-time transport costs, and the 2015 survey found that 21% of men and 26% of women received such help towards night commuting costs. For this group, the introduction of the night bus can become a pretext for employers to cut taxi funding. However, our interviews indicated that this risk was limited in its potential impact. Of the six employers who provided a full or partial subsidy towards taxi costs for night workers, none had withdrawn or were planning to withdraw this measure when interviewed. As one of them explained:

"We wouldn't take [the paid taxis] away. For the female part of the staff, I can't expect them to [take the night bus]. Because of safety, of which there is none in Bulgaria. At the moment [staff taxis at night] cost us 2,000 levs per month; this is a serious expense. But even with night buses, 10% of staff will always need to take taxis anyway." (Vesselin, 50yo, restaurant owner)

Furthermore, taxi subsidies were more commonly received by higher-income night workers (Exp(B) 1.44, 2-tailed Sig. 0.00, based on bivariate logistic regression). Overall, the introduction of a night bus service did not appear to have had exclusionary effects on the mobility of those whose taxi costs were being subsidised by employers.

8. Distances and destinations

In terms of distances travelled, men were likely to travel further to night work compared to women, but these differences were less pronounced than could be expected from research on daytime mobilities. Prior research has repeatedly demonstrated that women commute shorter distances compared to men, most often in order to combine paid employment with care responsibilities (Gil Solá, 2016; Kwan and Kotsev, 2014). In the case of night-time employment in Sofia, an independent sample *t*-test demonstrated the mean distance between home and night work to be 7 km for men, and 6.5 km for women (2-tailed Sig. 0.04; see Fig. 6). This could be explained with the fact that many care responsibilities have to be carried out during the day (e.g. escorting children, shopping), 'freeing' women to commute longer distances for night work compared to day work, even if in practice this often means working continuously during the day and night (Collectiu Punt 6, 2017; Sharma, 2014). In addition, given the age composition of the 2015 sample, we expect that among our respondents, women who work at night are less likely to have dependants.

Independent sample t-test					
		N	Mean	Std. Deviation	Std. Error Mean
Distance travelled to night work	women	520	6501.00	3702.99	162.39
	men	613	6962.59	3732.07	150.74
Distance travelled to night leisure	women	2601	5509.72	2877.56	56.42
	men	2616	5653.56	3027.58	59.19

	Distance travelled to night work (log)	Distance travelled to night leisure (log)
Beta	-0.06*	-0.02
p	0.05	0.29

Fig. 6. Comparison of means and standardized linear regression coefficients (Beta) and significance levels (p) of distances travelled at night for work and leisure, with gender as the independent variable (reference category is male).

The differences between women and men in distance travelled at night for the purpose of leisure were not significant. For leisure trips, the mean distance of men's trips was 5.7 km and that of women's trips was 5.5 km (2-tailed Sig. 0.26).

Given that the gender differences in distance travelled at night for work are both statistically significant and have important implications for gendered income inequalities (see previous section), here we discuss the role of the Sofia night bus service in enabling access to night-time work.

Night-time employment in Sofia is mostly concentrated in three districts. In 2015, 38.3% of all respondents who worked at night were employed in the central district of Sredets, where the majority of leisure and hospitality venues were located; 11.2% worked in the district of Mladost, a residential suburb which also houses Sofia's largest business park; and 8.7% in the district of Lozenets, a mixed-use area in the outer city centre, incorporating both upscale restaurants, bars and clubs, and several international call centres, which, like those in Mladost, offer better paid and more stable jobs compared to tourism and hospitality establishments. Women and men were equally likely to work in night jobs in each of the three areas. While there are other areas with concentrations of night-time work, our analysis focuses on the three districts with the highest share of night employment.

With transfer between night bus lines only possible at the central stop at Alexander I Square, the radial routes meant that the new service did not facilitate journeys between adjacent peripheral neighbourhoods. Thus, the night bus service has mostly improved access to night jobs in the city centre, where most work opportunities are in tourism and hospitality (see Fig. 7). Better-paid night jobs, mostly located in the district of Mladost, only became easier to access for those living along the Lyulin-centre-Mladost bus route (N1; see Fig. 1).

Working at night in (district):	Mladost	Lozenets
Exp(B)	1.91*	1.11
p	0.00	0.27

Fig. 7. Multinomial logistic regression odds ratios ((Exp(B)) and significance levels (p) of reported work destinations of night-time mobility, with income as the independent variable (categorical) and the Sredets (central) neighbourhood as the reference category.

At the same time, the highest share of night workers in terms of district of residence can be found in Studentski Grad (18.6% of total in 2015), which is adjacent to Mladost in the southern urban periphery, but as of early 2019, was only served by the N2 line. Despite the relatively short distance between Studentski Grad and Mladost, a large park located between them meant pedestrian and bicycle journeys at night were difficult, and taxi journeys required a detour, the cost of which could add up over time.

In this context, creating a link between the end stop of N1 and N2 would connect the district which is the most important source of night workers, Studentski Grad, to the location of the best-paid nocturnal jobs. While such a change in the organisation of the service would not directly affect men and women differently, women night workers' lower incomes means that access to better-paid nocturnal jobs has particular importance for this group. To pursue this, however, would mean shifting the local authority's current focus on farebox revenues (Focus News Agency, 2019) towards planning night-time transport with the explicit policy goal of greater social inclusion. That more people would be reached by a more extensive network is a self-evident observation. However, we argue that given the specific combination of built environment, spatial distribution of night jobs, and unequal incomes between adjacent areas, the connection between N1 and N2 at the southern edges of the city would constitute a highly targeted and cost-effective intervention.

9. Staying local and staying home at night

When considering mobility through a gender lens, immobility is as important as mobility, given women's greater commitments in and around the home, but also transport research's continued over-reliance on observed travel behaviour data (Hanson, 2010; Law, 1999). In this section, we aim to understand some of the dynamics which shape immobility, exploring how night-time public transport can reconfigure the gendered dynamics around staying in one's local area, and staying at home. In the 2015 survey, 7.5% of respondents reported not needing nocturnal transport because they stay at or near home, and notably, the share was similar among men and women. 23.3% of these respondents stated that when they do go out at night, they do so in their local area.

It can be tempting to assume that for those staying within their local area, a night bus offers limited utility, due to the short distance travelled and the low frequency of the service. However, two points need to be considered in order to qualify such an argument. First, as demonstrated in Section 6, some research participants saw the night bus as an overall improvement in safety, regardless of whether they use it themselves. Thus, for people making short journeys within the local area, the increased presence of people at and around bus stops constituted an improved nocturnal mobility experience. A second important dimension of local nocturnal trips is their diversity in terms of distances and routes. Through the dominant focus on motorised transport modes, transport use data sources have often neglected shorter journeys, or aggregated them into exceedingly large distance categories (Lebrun et al., 2014). Reflecting these dominant approaches, the questions used in the 2015 survey could only reveal that 60.1% of all nocturnal journeys were less than 5.0 km long. However, the lived experiences of nocturnal journeys clearly demonstrate the need for more granular data, and interview participants' accounts pointed out the many differences between navigating, for instance, a 1 km trip versus a 4.5 km trip:

"I: When I used to live further away, there were definitely instances when I turned down opportunities to go out at night because of the combined concerns of money and safety. When I lived in Studentski Grad and then in Mladost, both places were really limiting, because if you miss the last bus, you have to pay a taxi, which is around 7-10lvs per trip, so

you really aim to get that last bus. Now, I don't worry so much, I live in [Lozenets], so I just walk and wouldn't plan my trip home around a bus.

Interviewer: And if one comes along as you walk home?

I: Well, I wouldn't want to pay the night bus fare, it's only a short walk." (Ivelina, 34yo, model)

This quote demonstrates the importance which being able to 'hop on' an approaching bus spontaneously has for short-distance trips. The existing policy of selling tickets on board supports this to an extent (no need to be in possession of a ticket in advance), but short journeys would be more likely to be made by night bus if tickets were integrated into daytime public transport travelcards – particularly for those respondents for whom the cost of night transport is a significant concern. Notably, of those respondents who in the 2015 survey reported that they stay at or near their home at night (7.5%), 11.5% did so because they could not afford to go out. The likelihood of being in this position was not greater for either women or men. This group was more likely to have high expectations regarding the night bus than the average respondent: correlations significant at the 0.00 level (based on bivariate logistic regression) suggested they expected night-time public transport to benefit their cultural life; their mobility; and their economic circumstances. The possibilities for greater inclusion in the night-time city are especially evident with regards to this group, who framed the night bus as making the difference between immobility and mobility.

10. Discussion and conclusion

Night-time public transport raises important questions about processes of inclusion and exclusion in nocturnal cities and all that they have to offer. As McArthur et al. (2019) demonstrated in their analysis of the introduction of the London Night Tube, the addition of a new transport service at night does not in itself promote transport equity. Instead, the organisational, spatial, economic and social specifics of the service, often operating in highly situated ways, shape its uneven impact on the inclusion and exclusion of different groups. In this paper, we offer a framework for examining the social inclusion implications of a new night-time transport service from a gender perspective, which covered four dimensions: safety, cost, distance and immobility (staying local or at home). Drawing from data collected between 2015 and 2018 in Sofia, Bulgaria, and using a mixed-method approach, we aimed to demonstrate that the gender implications of nocturnal transport provision include, but go beyond, gendered concerns about safety and vulnerability. We found that overall, women in Sofia manage to sustain comparable levels of nocturnal mobility to those of men in terms of distances travelled, but do so while shouldering a greater economic burden (higher expenditure on taxis combined with lower incomes) and overcoming a more pronounced constraint of unsafety. The analysis demonstrated that in some domains where there were no obvious gender differences – such as the likelihood of staying at home at night, or working a well-paid night-job – gender relations are nonetheless at play.

The exclusion mechanisms which lead to inequality in night-time mobility, whether they are related to vulnerability, income, or the built environment are on one hand, an extension of exclusions faced during the day, and on the other hand, specific to the night-

time. Our analysis demonstrates that a policy of providing night-time public transport services can have a substantive impact on inclusive night mobility, however, much depends on the details of how the service is provided, and whether inclusion is indeed a policy goal when decisions are made. To ensure that Sofia's night-time public transport serves such a policy goal, a number of steps can be recommended based on our analysis. First, in terms of aspects of the service, international experience shows that night buses stopping on request can reduce the sense of vulnerability for those getting off the bus (Loukaitou-Sideris and Fink, 2008, p. 559). Second, to ensure that the night bus network serves the needs of those on lower incomes, making available travelcards which include the night service is paramount. Third, maintaining the job of the conductor in the face of budgetary pressures, given the conductor's important role of improving passenger safety and ensuring spontaneous boarding is possible, has implications for how and whether the service is used. Crucially, formal mechanisms for continuously monitoring and evaluating the impact of the service on social inclusion are needed, as well as a continued engagement by civil society, despite the pressure under which activist groups find themselves to move onto other pressing issues following the success of their campaign for the introduction of the service.

Beyond the relevance of these findings for Sofia, our aim in pointing out such omissions, as well as the achievements of the newly established service, is to contribute to a wider debate on how the role of night-time public transport to cities is conceptualised and evaluated. However, it is important that we also recognise the limitations of our analysis, which took place only a year after the introduction of the service. These limitations are relevant not only in the context of academic research, but for the efforts of Sofia Municipality to evaluate whether the service warrants extending. In early 2019, local activists were concerned that low recorded ridership figures (the 20,000 passengers recorded in April 2018 declined to 10,000 in September 2018), may lead to night buses being discontinued (Dnevnik, 2018b, 2018c). While we have aimed to demonstrate that the argument of farebox revenues should not dominate policy decisions around night-time transport provision, caution is needed also because of the time needed for passengers to learn about the existence of the new service, and become familiar with its routes, timetable and ticketing policies.

Future research on the social inclusion implications of introducing night-time public transport should also consider the impact on the taxi drivers who work the night shift (Sharma, 2014). While the focus of our paper is limited to the inclusion/exclusion of (potential) night bus passengers, the livelihoods of taxi drivers – who in Sofia are mostly men in precarious economic situations – are likely to have been put under additional pressure with the introduction of the new service (Spasi Sofia, personal communication).

Whether greater overall mobility at night is beneficial is a complex question. Night transport services result in increases in other night-time activity, impacting on urban inhabitants who rely on the night as a quiet time of rest, and on the demand for night work, with its erosive effects on health and welfare (Carpentier and Cazamian, 1978; Collectiu Punt 6, 2017; Sharma, 2014). As a result, introducing or expanding services which improve mobility at night requires careful targeting, and critically examining the competing priorities of improving mobility at night, while not eroding the right to a restful night. At the same time, it is important to unpack the inclusion implications of

new types of nocturnal mobility, since their benefits are not equally distributed, but inevitably advantage some, while creating new barriers, and amplifying existing ones, for others.

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